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THE COVER

A photograph of the famed Boehm Bobcats. The story on this magnificant porcelain is on the facing page.

THE MUSEUM OF SCIENCE

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Porcelain Donated to Museum

Century Members Eligible for Prize

Would you like to own the Boehm Bobcats? Then read on...

By GEORGE SINGER

The magnificent porcelain shown in color on the cover now belongs temporarily to the Museum of Science. It was presented to the Museum by Mrs. Edward Marshall Boehm through the courtesy of Neiman-Marcus.

In the history of fine porcelain, the name and art of Edward Marshall Boehm (1913-1969) have joined those on the highest plateaus of excellence and recognition. Edward Boehm's porcelain creations are sought after by collectors and connoisseurs the world over.

Collections of his works have been acquired by 45 of the world's great museums and institutions including The White House, Smithsonian Institution, John F. Kennedy Center, Metropolitan Museum of Art, Buckingham Palace, the Vatican, Elysee Palace and the Kremlin—places far different from the barns and fields of McDonogh School in Baltimore where their creator's lifelong love affair with nature began.

Although Boehm (pronounced Beam) died in 1969, sculptures designed by him continue to be cast at his studio in Trenton, N.J., together with new pieces fashioned by colleagues along the guidelines he projected. His widow opened a second studio in Malvern, England, where the Museum's Bobcats were designed and cast.

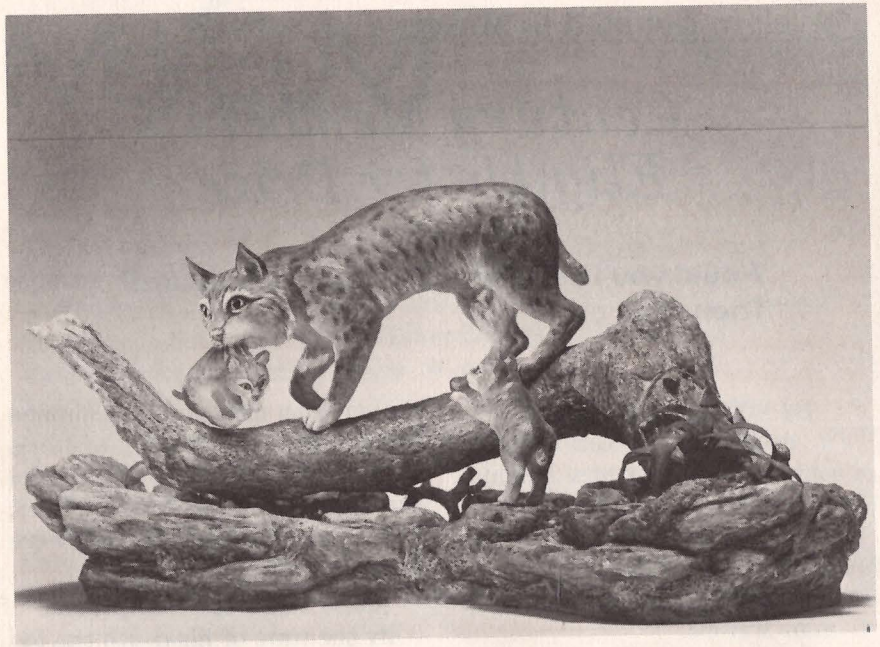
More Than 350 Sculptures

By the time of his death the 55-year-old artist and naturalist had completed more than 350 sculptures, some in single and others in limited editions.

Today the Boehm studio can dictate which stores across the country carry its merchandise. Neiman-Marcus is one, selected as a member of its "guild of appointed galleries."

The making of a Boehm object of art is not easy. Besides the intricate steps in the original, the creating of the porcelain is in itself an art.

Hard porcelain, as made in Trenton, starts with flint, feldspar, English clay and china clay. The formula for bone porcelain produced at the Malvern factory is 50 per cent bone ash. Bone porcelain is fired at lower temperatures than true porcelain and is softer and less durable. It is slightly more translucent and can be molded into more delicate shapes. The making



of hard porcelain cannot be hurried. It involves a total of 52 hand operations.

Studio's Work Was Charted

On Mr. Boehm's death, Helen Boehm already knew what the future must bring. Her husband had charted the ongoing work of the studio. While continuing her position as administrative leader of the studio, Mrs. Boehm also assumed her husband's role as director of design.

Thus it was under her direction that the Boehm Bobcats was created. The Bobcats were cast in Malvern in England bone porcelain. This piece was introduced in 1971, with a limited edition of 200. The edition was completed in 1974. Of the two hundred, models do exist in other museums including the John F. Kennedy Center for the Performing Arts in Washington D.C. The Bobcats was the first of the animal pieces created by the Boehm Studios. It has a present retail value of $1,600.

On the evening of March 18, the Museum of Science became the temporary owner of the Boehm Bobcats. At a cocktail reception in the Bal Harbour store, Neiman-Marcus was host to the Museum of Science Board of Trustees and invited guests. The Boehm Eagle of Freedom, the life-size porcelain figure of our national symbol, was exhibited at the party. The Eagle, created for our country's 200th anniversary, highlighted the Bicentennial Celebration showing of Boehm pieces at Neiman-Marcus.

During the festivities, Mrs. Edward Marshall Boehm made the formal presentation of the Boehm Bobcats to the Museum. Mrs. Sydney L. Weintraub, chairman emeritus,

(Continued on Page 30)

Guatemala Terremoto

An Eye Witness Account

By FREDERICK NAGLE, Ph.D. and JOSHUA H. ROSENFELD

"It's amazing how fast your heart can get into your larynx... The initial shock lasted about 37 seconds but it seemed longer. One had to support oneself in order to walk across the floor. Electricity failed immediately. A long, rumbling, roar accompanied the quake punctuated by crashing objects and creaking structures. A brief quiescence followed the first movement.

"In this observer's second floor apartment, damage through sliding and falling objects gave the impression that these effects were caused by east-west horizontal movements. The vertical movements felt as if one were in a speedboat moving rapidly over choppy waters. The reinforced concrete structure in which these observations were made suffered no damage, although a similar structure next door took a slight list and dropped plaster.

"Adobe structures throughout the city were heavily damaged and avalanches of shocks occurred in the steeper barranco colonies. The older and poorer parts of the city suffered the most. High rise buildings stood intact but furniture and glassware on the higher levels were tossed into a homogeneous heap.

"About 10 minutes after the first shock, another similar one began causing the population to flee for the open places. Regular after shocks were felt very often until about 8:45 a.m.... Panic was at a minimum and casualties seemed light in the central part of the city, although many sirens were heard during the night."

The comments above were written in Guatemala City by one of the authors, Joshua Rosenfeld, during the morning of Feb. 5, 1976.

What Happened and Why

An earthquake initially measuring 7.5 magnitude on the Richter scale struck Guatemala on Feb. 4, at 3:02 a.m. local time. It's focus, determined by the U.S. National Earthquake Information Service, Golden, Colo., was placed at 15.3°N, 89.2°W and at a depth of 29 km. This is approximately 200 km northeast of Guatemala City, just south of Lake Izabal, and very close to the surface expression of the Motagua fault zone which traverses the entire country from east to west. This particular fault, together with the parallel Cuilco-Chixoy-Polochic fault some 100 km to the north, forms a complex disturbed zone thought to be the major tectonic boundary separating two large crustal plates, the North American and Caribbean plates. Several recent studies esti-

Dr. Nagle is Associate Professor of Geology at the University of Miami. Mr. Rosenfeld is an M. S. candidate, Geology-Geography, at the University, in residence in Guatemala.

mate that the relative motion of the North American plate to the Caribbean plate is in the range of 2-3 cm per year.

Occasionally, the energy built up by this motion results in rock fracture and a violent earthquake; more often it is released over a period of time in the form of lesser magnitude shocks. The situation along the Motagua fault zone is similar to that which exists along the San Andreas fault zone on the west coast of the United States where the Pacific plate is slipping past the North American plate. There, too, occasional violent earthquakes occur, such as the San Fernando earthquake of 1971, which had a magnitude of only 6.6, but did $1 billion worth of damage.

Meaning of Magnitude

The magnitude of an earthquake is generally referred to the Richter scale proposed by C. F. Richter in 1935 and refined several times since. This scale is based on the amplitude of seismic waves recorded by seismographs, (actually, the logarithm of the maximum amplitude plus an empirical factor to account for the weakening of seismic waves away from the focus). A change in magnitude of 1 on the scale means a change in wave amplitude of 10. The largest earthquakes yet recorded (such as the Alaska 1964 quake) have magnitudes of about 8.6.

In a way, the magnitude is an index of the quakes' energy measured at its source. Earthquakes of magnitude 8.0 release greater than 10^{25} ergs (an energy unit) approximately equal to 1000 explosions of 1-million tons TNT each. Fortunately, an earthquake of this magnitude occurs on Planet Earth only once every five to ten years.

Each year some 850,000 earthquakes are recorded from around the world. Most of these, approximately 800,000 are of magnitude 2.0-3.4, too small to be felt except by instruments. Only four or five earthquakes per year are in the 7.5 range of the Guatemalan earthquake. Following the main shock on Feb. 4, Guatemala was rocked by hundreds of after shocks continuing for more than two weeks. Several of these were of 5.5-6.0 magnitude, which is strong enough alone to damage buildings. Many people who survived the first shock were killed or injured during the after-shock period. Some buildings, already damaged but still standing, were flattened during this period.

Will It Happen Again?

Guatemala, indeed all of Central America, is truly earthquake country. The region is caught in a squeeze between several giant crustal plates moving in different directions.

Hundreds of small magnitude earthquakes each year are associated with a chain of volcanoes paralleling the Pacific coast. This line of earthquakes and volcanoes is caused by the Cocos plate diving under Central America. (Fig. 1).

Also, each year several small earthquakes occur along the Polochic fault as North America pushes past the Caribbean. Those are the two main earthquake belts caused by the interaction of plates shown

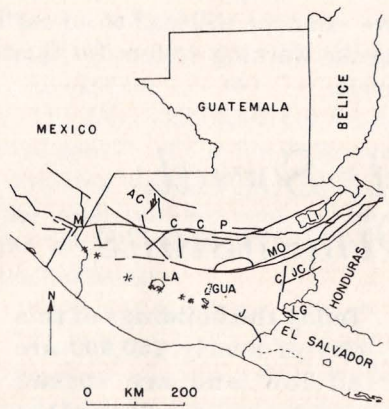


FIGURE 1. Outline map of Guatemala showing features observed on Skylab IV *photographs. Cuilco-Chixoy-Polochic (CCP) fault and Motagua (MO) fault are most prominent linear features. Bifurcation at western end of Chixoy fault at Motozintla de Mendoza, Mexico (M), is well displayed. Grijalva Valley boundaries in southern Mexico and Jalpatagua (J) fault of southern Guatemala are prominent. Asterisks = large volcanoes. AC = Altos Cuchumatanes Mountains; LA = Lago Atitlan; LI = Lago Izabal; LG = Lago Guija; GUA = Guatemala City; J = Jalpatagua fault; JC = Jocotán-Chamelecón fault; C = Chiquimula. Dashed line in western El Salvador is summit line of Volcan de Santa Ana. (from: Muehlberger, W. R. and Ritchie, A. W., 1975,* Geology, *v3, no. 5, The Geological Society of America)*

in Figure 1. In response to this interaction, smaller northward trending faults have opened, two of which border on Guatemala City. In the opinion of W. R. Muehlberger of the University of Texas, Guatemala is in effect being rotated slowly counterclockwise and developing small north-south splits.

Ironically, the present site of Guatemala City was chosen following a major earthquake in 1773 which destroyed the old capital of Antigua 20 km to the southwest. The new capital has been hit by large earthquakes before, in 1917 and 1942. It seems very likely to suffer future earthquake shocks.

Predicting Earthquakes

There has been much publicity of late concerning the improving science of earthquake prediction. Major advances have been made in Russia, China, Japan and the United States toward this goal. In fact, several small earthquakes in New York, California and other areas have been forecast and have occurred. One should keep in mind, however, that each earthquake area has different rocks under somewhat different stress and therefore may behave in a different way.

Even so, it is possible that if the appropriate monitoring equipment and trained observers had been closely watching the Motagua, some warning could have been given and perhaps some of the 22,000 killed and 75,000 injured might have been spared.

We will not know how strong a possibility this was until the record of this quake and its aftershocks have been carefully studied. Presently, a USGS team of specialists is working with Guatemalan

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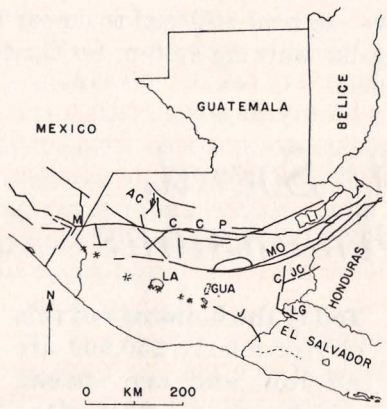

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scientists attempting to reconstruct events leading up to the earthquake. Their study, plus studies by faculty and students of the Department of Geology, University of Miami, and others which will follow during the coming months, we can hope will lead to an earthquake warning system for Guatemala.

Notes on Its Social, Economic Dimensions

By A. P. MAINGOT, Ph.D.

"Highland Guatemala is a land of frequent earthquakes. The old capital, Antigua, was devastated in 1773; and so frequent were the destructive quakes at that site that the Spaniards decided to shift their seat of government to the present Guatemala City. Although perhaps a little safer than Antigua, the new capital has suffered frequently, being almost completely destroyed in the big earthquake of December, 1917, and January, 1918. Today the buildings of this city of nearly 250,000 are all low and are spread widely over the floor of the basin." (Preston E. James, *Latin America.* New York, 1942, p. 617-18.

"And if we didn't know already, we now know that adobe is deadly." (U.N. expert, 2/7/76.)

"Villagers were stacking unbroken roof tiles. Fresh adobe bricks were drying in the sun...The rebuilding process had begun." (James P. Sterba, *New York Times,* 2/14/76, p. 7.)

As if guided by some malevolent grand architect, the people of Guatemala are rebuilding where destruction had repeatedly taken place; the adobe which once before collapsed will again sustain the neat rows of lovely but deadly clay tiles.

At 42,042 square miles, Guatemala is 12,000 square miles smaller than the state of Florida and its population falls three million short of this state's nine million. Fully half these Guatemalans are Indians belonging to six major linguistic groups; the rest are Spanish-speaking Indians and mestizos acculturated to European ways and a small group of whites of European descent.

Nearly one third of this population lives on a mountain range dotted with 14 volcanoes interspersed with fertile and productive plateaus. This cool, tropical highland in the southwestern part of the country known as Los Altos (literally "the heights"), and the piedmont which slopes to the Pacific coast, are the centers of coffee, cotton and cattle cultivation. These, along with bananas and sugar, represent some 70 percent of all exports.

The author is Dean of International Affairs at Florida International University.

The 300 inhabitants per square mile density of the Los Altos area compares dramatically with the one inhabitant per square mile in the low-lying area of El Peten in the northeast.

Subsistence Agriculture

The rest of the Guatemalan economy is based on small industry and tourism. A substantial sector of the Indian population is in subsistence agriculture and thus is outside the "national" economy.

How has this economic base been affected and what are some of the probable social consequences of this?

There are difficulties in this form of social accounting under the best of circumstances; we have here the worst of circumstances. What is attempted is a global assessment.

A logical first focus should be the coffee sector. All indications are that the crop itself was not severely damaged. Guatemala's foremost customers for this product are the United States and Western Europe, and these markets require an Atlantic outlet. The principal transportation route in the country is the Motagua Corridor which lies on the Motagua Fault. This route links the rich and populated Los Altos region with the Caribbean port of Puerto Barrios by paved road and railway and it is precisely this route and facilities which have been hardest hit by landslides, fallen bridges, destruction of roadbeds

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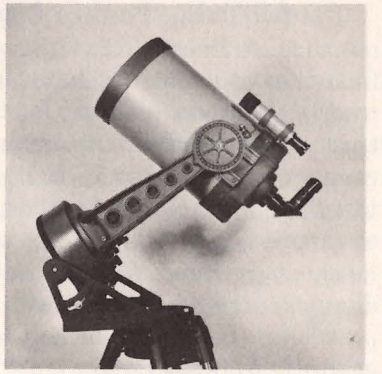

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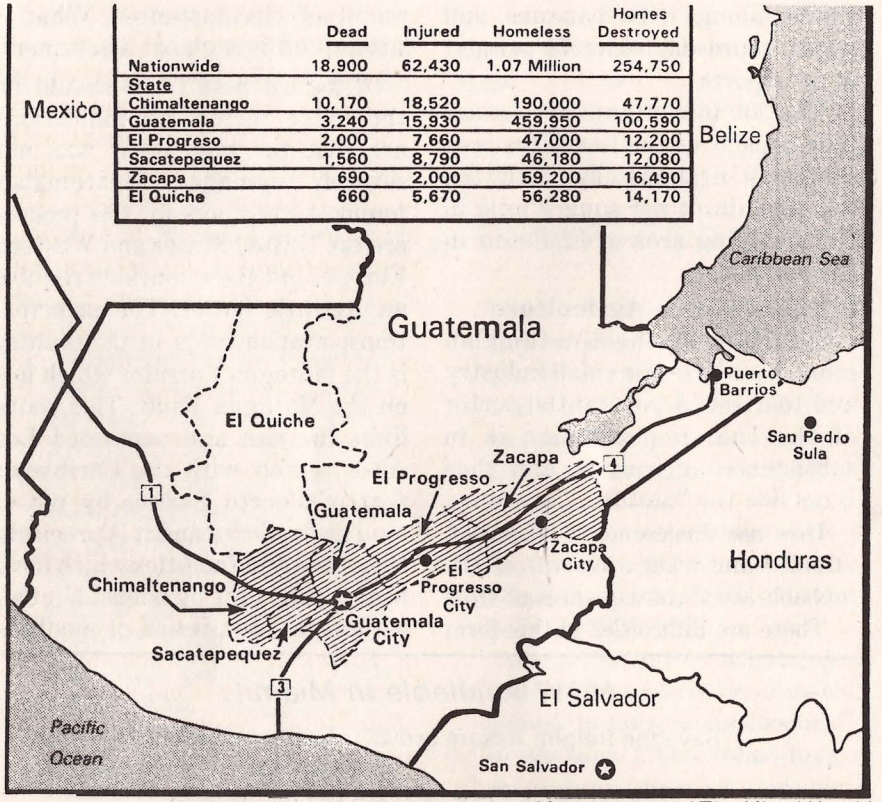
Six states bore the brunt of an earthquake that shook Guatemala in February, claiming casualties in 16 of the nation's 22 regions:

	Dead	Injured	Homeless	Homes Destroyed
Nationwide	18,900	62,430	1.07 Million	254,750
State				
Chimaltenango	10,170	18,520	190,000	47,770
Guatemala	3,240	15,930	459,950	100,590
El Progreso	2,000	7,660	47,000	12,200
Sacatepequez	1,560	8,790	46,180	12,080
Zacapa	690	2,000	59,200	16,490
El Quiche	660	5,670	56,280	14,170



Map courtesy of The Miami Herald

and changes in the depth of the port, Puerto Barrios.

The two Pacific Ports of Champerico and Puerto San José are linked by rail but are hazardous roadstead harbors unsuited for this trade. A Guatemalan businessman's comment to the *New York Times* that "The backbone of Guatemalan commerce has been broken," is only mildly exaggerated. With the usually disruptive rainy season fast approaching (beginning in May and ending in November) there is a great chance that this coffee crop might not make it to port in sufficient amounts. The only saving grace on the coffee side of the economy is the rising price of the product on the world market due to the losses in Brazil (hard freeze damage), Angola (civil war damage) and the substantial decline in Central American production brought about by bad weather.

Same Analysis

The same analysis can be applied to the other sectors of the economy, i.e. the potential losses due to the disruption of transportation routes.

The one sector which apparently escaped relatively unscathed is the tourist industry and this might be a very important dimension in the economic recovery. The major hotels in Guatemala City and Antigua survived, so did the ones near Lake Atitlan and Chichicastenango. The roads connecting these traditional tourist centers are operational. The other center of tourist activity, the Maya city of Tikal in the north, is functioning with air travel and hotel accommodations near normal.

Whatever the relative damage by sector, the fact remains that there is one area which lends itself much less readily to measurement and evaluation: the human resources of a country.

Standard of Health

A fundamental gauge of the condition of human resources is the standard of health. Under non-catastrophic circumstances, Guatemala measures up very poorly in this respect. An American health official calculates that up to 80 per cent of Guatemalan children suffer from malnutrition, protein deficiency being the most frequent ailment. Clearly contributing to the poor state of general health is the question of housing. With only 22 percent of the houses served by electricity, 29.5 percent served by piped water and 30.3 percent with any form of toilet, one gets an idea of the deficiencies involved. The statistics on housing destruction, therefore—and 1,100,000 are calculated to be homeless—are not any more significant than the statistics on "decent" or, at least not explicitly, unhealthy housing.

The fact that the masses of Guatemalans in those 300-odd towns and villages affected by the quake are rebuilding with exactly the same materials and designs as before merely means that this critical area in the determination of the quality of human resource, housing, will remain the same if not worse even after "total" recovery. The crucial question is, therefore, recovery to what?

Museum With a Heart

By GEORGE SINGER

Just before Valentine Day, the Museum of Science, through the people who support it, proved its heart was big. It sent a Valentine to the people of Guatemala.

Not the paper kind with a sentimental message, but rather the heartfelt type that answered a call for help.

On Wednesday, Feb. 4, the pendulum of catastrophe swung toward the land of Guatemala. Late in the day the Earth shook violently. The deep rumble of moving strata was joined quickly by the sharper sound of crumbling buildings. Earthquake! Screams of fear and pain rose as the land convulsed.

By Thursday morning, sketchy reports began to filter out of Guatemala City. Amateur radio operators provided the main source of information.

The Museum has close ties with Guatemala—ties concerning the loan of Stela 24 in our Maya Plaza, plans to bring a Guatemalan rug

painter to Miami, and through the members of our affiliate, the Institute of Maya Studies. It was only natural that the Museum and its members would be concerned.

By noon Thursday, a hurried meeting was called at the Museum as the human toll mounted. Those attending, Mrs. Saralee Weintraub, Don Starkey, Rolando Millas and myself, decided that we needed to know more about the immediate needs in Guatemala.

As the day went into evening we were no closer to a decision on what should be done. Officials from Aviateca Airlines arrived in Miami late in the day. Their facts coupled with the information obtained from local "ham" radio operators gave us the picture we needed. Many phone calls through the evening brought us to a meeting of the minds around 11 o'clock. It was too late for the TV newscasts, but the information was given to the Herald and calls would alert the broadcast media early Friday morning.

The call went out for blankets, nonperishable food and clothing. The Red Cross had already made an appeal for money, but through our contacts we found the need more immediate. All stores in Guatemala City were closed and the night time temperatures were dropping into the 30's. People without homes, food, clothing or bedding were living in the streets. The Guatemalan relief effort of the Museum of Science was underway.

Friday the 6th was bedlam at the Museum. The phones rang con-

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Bob East photo, courtesy of The Miami Herald

VOLUNTEERS busily packed Guatemalan earthquake relief donations under the mangoes. (Photo courtesy of The Miami Herald).

stantly, volunteers were frantically rounded up, donations began arriving, but gradually organization took over and by Friday afternoon things began running smoothly.

For the next five days, through closing time Wednesday Feb. 11, the relief drive continued. The Library of the Museum became the control center for the activity. Thousands of phone calls were received and made. A local firm provided trucks to take the donations from our parking lot to the airport and to pick up items from all over Dade County.

The center picnic area of the Museum parking lot was used for the collection point as people drove in to give their donations. The tables under the chickee shelters were used for the sorting of the variety of items collected.

Volunteer workers came from the Museum's Latin American Women's Committee, Friends of Key Biscayne, the Institute of Maya Studies and some people who have never been inside the Museum. Folks who drove in and donated articles saw how busy it was and just pitched in to help, not just one day, but for the entire drive.

There was the old car that sputtered into the parking area carrying a man and wife with their three children. They gave three large boxes of food. The car battery quit while they were unloading and our workers got some jumper cables to

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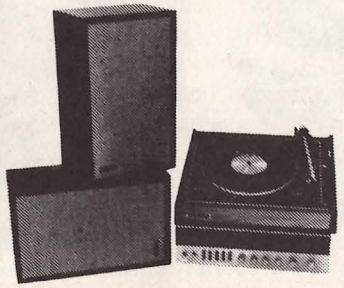

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get him started. They observed that this family could have used the food well to take care of themselves—they were poor, but they gave.

Some things were amusing, like the two gentlemen who removed their jackets while working in the heat of the day, only to discover when they went to retrieve them from a nail in a chickee that someone had packed them in a box. The jackets were on their way to Guatemala.

Or how about the elderly lady working with our group who needed a cane to assist in walking. You guessed it, the cane was packed up and shipped.

Then there were the men who kept calling, one had 2,000 pounds of frozen fish who couldn't understand that there was no refrigeration available. The other one had a crate of melted candles. We still haven't figured that out.

In all some 1,580 cartons of food, blankets, clothes, medical supplies and water containers were sent by truck from the Museum. There is no way to estimate the number of articles picked up at private homes and collection points and taken directly to the airport freight depot of Aviateca Airline.

A total of $2,902.51 was also collected in monetary gifts. This money was used to buy other things needed by the people of Guatemala.

Less Sunshine

NOAA studies reveal that in the 23 years between 1950 and 1972, sunshine in the 48 contiguous states decreased by 8 per cent.

So-Long, 39 Charlie

For 39 Charlie, the end came on Dec. 1, when the venerable DC-6B's research career came to a quiet stop at the Air Tech hangar NOAA occupies at Miami International Airport, NOAA magazine reported in its current issue.

There has been no career quite like 39 Charlie's. The airplane flew some of the world's most difficult atmospheric terrain, from the Indian Ocean monsoon to the tropical Atlantic to the turbulent interiors of cumulus towers. Hurricane symbols on the fuselage denote 321 penetrations of 42 hurricanes. The aircraft bears the flags of 40 nations and one territory, many of whose scientists have used this research platform's unique capabilities. Probably there is not another aircraft in the world that has done so much to advance our knowledge of the atmosphere and ocean.

NOAA 39 also represents a milestone in the way aviation has been applied to the work of doing science in the sky. What is now the National Weather Service noted in the 1950's that a serious effort was required to field airborne platforms for hurricane research. Accordingly, two DC-6 aircraft were obtained in 1959 from Trans-Caribbean Airlines, and the U.S. Air Force transferred title of a B-57 jet to the Department of Commerce. NOAA 39 is the only survivor of that old trio of research aircraft, and that career has now ended.

The DC-6 leaves an organization that is greatly changed from the old days. Now called the Research Facilities Center, NOAA's aviation group has become a national center of excellence for using aircraft to extract information from the environment. The new equipment reflects that. NOAA 42, a WP-3D delivered by Lockheed-California in Burbank last June, is on the line in Miami now, being readied for research. This month the second WP-3D, NOAA 43, will be delivered in Burbank.

These, together with NOAA 41, the C-130, will constitute one of the world's most advanced squadrons of research aircraft.

Sigma Xi, Museum Begin Joint Meetings

By SCOTT C. DAUBIN, Ph.D.

The University of Miami Chapter of the Society of the Sigma Xi and the Museum of Science inaugurated a program of joint meetings on Feb. 19 at the Rosentiel School of Marine and Atmospheric Science with an address by Dr. Jean Houston entitled, "New Ways of Being."

The Society of the Sigma Xi, the Scientific Research Society of North America, is an old and respected scientific organization whose beginnings go back to the 19th century. Its motto, "companions in zealous research," reflects the two primary concerns of the Society: friendship among investigators in many diverse fields and the encouragement of research.

An objective of the UM Chapter of Sigma Xi is to further public understanding of science, its purposes, methods and implications for society. To achieve this goal, the local chapter is seeking ways to improve communications between scientists and the general public. Since this objective is shared by the Museum of Science it is appropriate that the two organizations cooperate.

The Feb. 19 meeting was the last of its university year but both groups look forward to future joint meetings and other ventures to inform the public on the scientific issues of the day.

Dr. Daubin is chairman of ocean engineering at the University of Miami and is president of the Chapter of the Society of the Sigma Xi.

Hamburger Texture Given Minced Fish

Minced fish with the texture of hamburger may soon be available, the National Marine Fisheries Service announced.

The fish has the same nutritional value as beef but is lower in fat content and is cheaper to produce.

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Where the Sea and Man Meet

THE COASTAL ZONE

Fishing, Recreation, Commerce, Energy, Esthetics Must Be Considered in Plans To Use Southeast Florida's Coastal Zone

By HARRIS B. STEWART JR., Ph.D.

The coastal zone has been described as the zone where the sea and the land meet, but I submit that the problems come not because it is where the sea and the land meet, but because it is where the sea and man meet. It is the injection of man himself into the coastal system that creates very real problems.

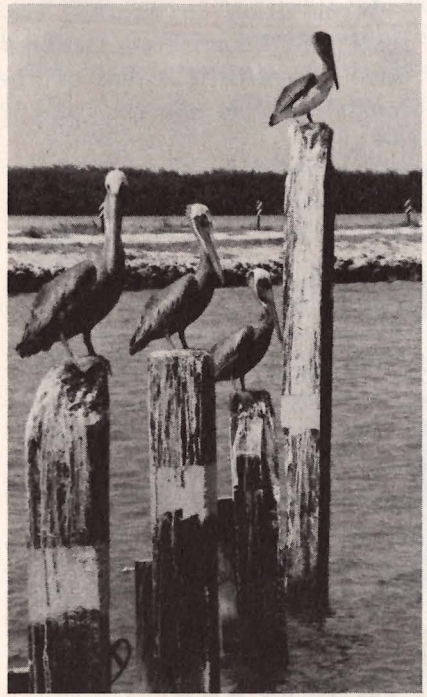

Photo by Dr. Donald P. deSylva

Dr. Stewart is director of the Atlantic Oceanographic and Meterological Laboratories, NOAA, on Virginia Key. The accompanying article is a condensation of an address he made last fall to the Workshop on Coastal Zone Economics.

Let's look briefly at some of the economic aspects of the wet side of the Florida coastal zone.

Look, for example, at the value of the fish landings in the South Florida area. The actual value has gone up even though the total volume of landings has in fact gone down. This is related, as one might suspect, to the increased price for fisheries products.

Remember that a portion of the life cycle of nearly all of both the commercial and sport fish which contribute so largely to the South Florida economy is spent in the shallow mangrove fringes. These shallow coastal mangrove areas are areas of extremely high productivity and areas where man also has made very heavy incursions. Once an area is dredged and bulkheaded, there

is no chance for the fish to spend that critical part of their life cycle in the area anymore.

Boating More Popular

The recreational aspects of the wet side of the coastal zone certainly should not be neglected. Recreational boating is on the rise. Between 1970 and 1973, boating registrations in the South Florida area rose 15.3 per cent. A recent poll taken of tourists coming into the south Florida area indicated that a significantly large percentage of tourists were attracted to the area by the water sports available here. In 1974, the tourist industry in southeast Florida amounted to some two billion dollars. Therefore, one must keep in mind the fact that the maintenance of good recreational facilities within the southeast Florida coastal zone is an important aspect of the economic development of this zone.

Commerce is a large portion of the industrial economic activity of southeast Florida. Check the numbers of passengers, the volume of freight and the total monies coming into the area as a result of our major port areas – the Port of Miami at Dodge Island, Port Everglades at Ft. Lauderdale and Port St. Lucie.

In addition to fishing, recreation and commerce, I submit that the esthetic value of the coastal zone is one that should not be overlooked. It may be difficult to put cost figures on it, but certainly an attractive coastal area cannot be underrated for its economic value to the south Florida coastal zone. Industries and people come to south Florida to work and to live because it is a pleasant place to work and live. In addition to our pleasant climate, the major attractive force for these people is our ocean.

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Energy Problems

But we do other things with our ocean that have economic import. Let's take a look briefly at energy. The minute you say "energy" and "coastal zone" in the same breath in south Florida, people immediately say "Turkey Point," the major power plant of Florida Power & Light. It has had lots of problems, but these problems have been brought about primarily because we are now living in an era of eco-hysteria. Because so much furor was raised over the apparent destruction of approximately 60 acres of turtle grass on the bottom of Biscayne Bay, the company was forced to go to some other technique for cooling the waters used to cool the power plant. As a result, they constructed a "radiator" of 200-foot wide cooling canals through the mangroves south and west of the plant. I would rather not get embroiled in a controversy on the relative merits of 60 acres of bay bottom versus something over 600 acres of mangroves.

"The major problem in the coastal zone arises because it is a resource held in common and a resource for which many of the uses are in mutual conflict."

So, the problems of the coastal zone are not only economic ones. They are environmental ones; they are legal ones; they are social ones; they are political ones. This must be kept in mind.

There is another facet of the energy aspect of the coastal zone. This is the possibility that the ocean side of the coastal zone will in time be utilized for the development of energy for supplying, at least in part, the needs of the growing southeast Florida area. There are two systems that appear to be particularly attractive at this point.

The first one is the one known in the business as Delta-T. That is, it is the system which utilizes the temperature difference between the warm surface waters and the cooler waters at depth to run a closed-cycle Rankin-type heat engine. The other is the possible utilization of the Florida current portion of the Gulf Stream system as an energy source. In addition there is the possibility that offshore reactors – nuclear reactors or possibly fossil fueled

power plants – could be sited in the waters off Florida where the problems with cooling water would be vastly reduced.

Offshore Wells

As long as we are talking about energy, I feel I must say that for the immediate future the major energy source from the ocean will be oil and gas from wells drilled offshore. To date, the northeast Gulf of Mexico areas for which the oil companies had such great hopes just have not proved out. The oil does not appear to be there. We will worry about that one when the possibilities look a little brighter.

Another possible use of the wet side of the coastal zone in relation to the energy problem is the potential development of deep water ports. This involves the establishment of what is called a mono-buoy offshore – pipelines running from the mono-buoy up into the dry side of the coastal zone to refineries well inward from the coastal area. To the mono-buoy would come large tankers that could not possibly negotiate the narrow channels and shallow areas nearer to shore.

The major problem in the coastal zone arises because it is a resource held in common and a resource for which many of the uses are in mutual conflict. Perhaps the best enunciation of this problem is provided by Garrett Hardin in an article written for Science magazine several years ago.

"If you want to use bays like Biscayne Bay as disposal sites for sewage, fine. They are good ones; they flush themselves twice a day and are relatively effective disposal mechanisms. But if you want to use them for that, don't plan to use them for much else."

In the last century in Europe it was a normal practice to have a central common within a community. The idea here is that the common could support a certain number of cattle. Let us say that the maximum sustainable yield was 100 head of cattle on the common. Any more than 100 cattle would mean a deterioration of the resource.

Let us now assume that there were ten herdsmen in the town, each of whom had ten cattle. This meant that grass was growing just as fast as the cows could eat it, and everything was just fine; the common was able to support the animals that were feeding on it. Then one of the herdsmen began to realize that if he added one cow to his herd, they would be then 1 per cent over what the common could maintain, but the deleterious effect would be shared by all ten of them, and his share of this would be only 0.1 per cent. However, the worth of his own herd would be extended by 10 per cent.

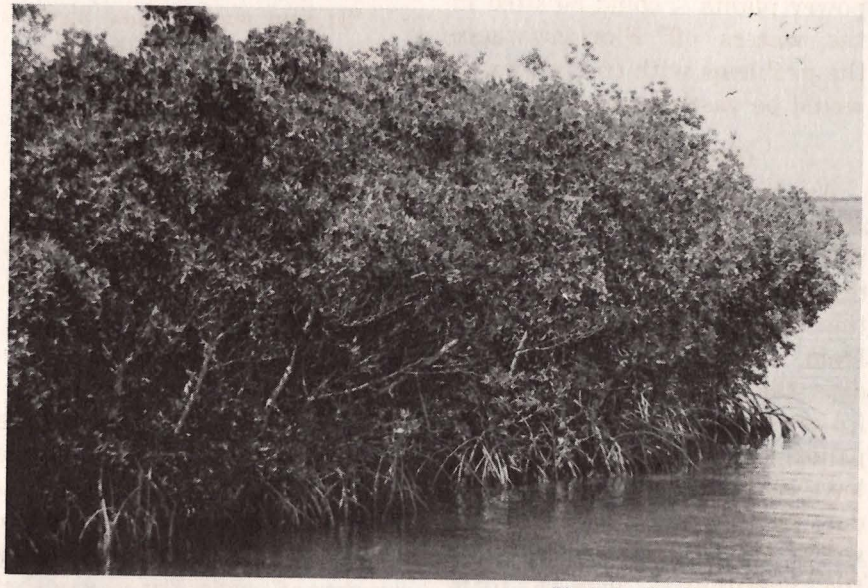

Photo by Dr. Donald P. deSylva

A Mangrove Thicket

Thus, even though he would share in the depletion of the resource, his own net gain would be some 9.9 per cent. So by adding one cow to his herd, he would gain nearly a 10 per cent increase; so he added his one cow. Other herdsmen saw what he had done, and each of them added one cow, and very soon the grass was not able to keep up with the munching, the whole common disappeared, and none of them was able to benefit from what originally had been a very fine resource.

There is a lesson to be learned from this analogy insofar as the Florida coastal zone is concerned. When there were 200 people living on Biscayne Bay, they could dump all of their sewage directly into the bay and the bay could accommodate it. But now with several million people living on the same bay, the problem has become acute: if you want to have boats tied up at your marinas with no system for taking care of their sewage, then you can not expect to swim in the boat slips with impunity—at least esthetic impunity.

If you build causeways, you cannot sail through them.

If you bulkhead your mangrove areas to put up condominiums, you can not expect to have your sport and commercial fisheries as productive as they have been in the past.

If you want to use bays like Biscayne Bay as disposal sites for sewage, fine. They are good ones; they flush themselves twice a day and are relatively effective disposal mechanisms. But if you want to use them for

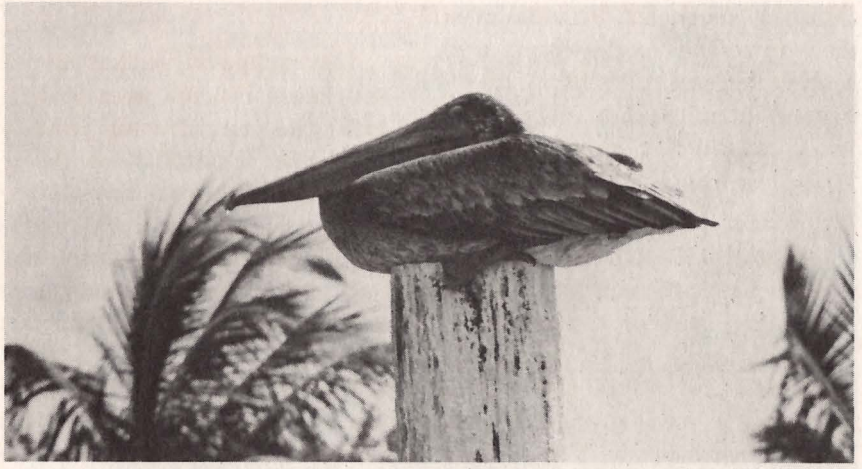

Photo by Dr. Donald P. deSylva

A Bay Squatter

that, don't plan to use them for much else.

Coastal Zone Program

The question then is: how do you avoid totally destroying your "common" and still maintain viable uses for many of those who would use it even though the uses are in conflict? Its solution will, I suspect, be in large measure a political solution. This bothers me a little bit as a scientist who is in love with the ocean on the wet side of the coastal zone, but again we have come to learn to live with life as it really is.

Through the Coastal Zone Management Act and the interaction between the federal government and the states there has developed a really fine program whereby the federal government will provide funds for the development of individual state plans for management of the coastal zone.

There is one other aspect: the need for new ideas, particularly exciting new concepts. Somehow, though, "the system" just does not seem ready for new ideas. There seems to be an allegiance to the *status quo* which I find quite disconcerting. But let me give you an example of what I mean.

I can think of five specific south Florida coastal zone problems which could be solved with one solution: the problem of our incredible beach erosion; the problem related to storm surge associated with hurricanes; the problem of inadequate beach frontage; the problem of providing adequate offshore sport fishing areas; and the esthetic problem or the environmental enhancement problem.

My contention is that all five of these could very neatly be solved by the establishment of offshore islands. My proposal is that the southeast Florida area look into the engineering and economic feasibility of developing offshore islands. These islands would be man-made islands situated in 50-60 feet of water.

Off Miami Beach, for example, this would probably be in the order of a mile or a mile and a half offshore. These would be linear islands, maybe a mile to a mile and a half long, maybe a hundred yards wide. They would be built up from the sea floor, and once they broke the surface they would be covered with top soil, and one would plant sea grapes and palms that can survive in that fairly rugged coastal zone environment.

But how would these solve the problems? Let me take the points I made in reverse order. First, the esthetics. As you look out of a Miami Beach hotel instead of seeing an empty expanse of ocean, beautiful though I consider that happens to be, you would see a series of palm-covered islands parallel to the shore, which would help to erase our image as spoilers of the environment and switch it to one of improvers of the environment.

Sport Fishing

What about the sport fishing? It is well known that the development of offshore reefs, particularly artificial reefs whether they be made up of rocks or old automobile tires or sunken vessels or serpulid worms, provides an ecological niche where fish gradually congregate in increasing numbers until you have developed a very good sport fishery. So, my offshore islands would also do this.

"My proposal is that the southeast Florida area look into the engineering and economic feasibility of developing offshore islands... These would be lineal islands, maybe a mile to a mile and a half long, maybe a hundred yards wide."

Within the south Florida area we have relatively few beaches which are open to the public. With the increasing population, there is increasing pressure for recreational use of beaches, and these islands would in fact provide additional frontage for swimming, sunning, surfing and all the other things that people do on beaches.

These offshore islands would also reduce the waves and it is on that aspect that my last two benefits from these offshore islands rest. With an approaching hurricane, there is a build-up of sea level because of the waters being pushed shoreward by the strong winds. The rising water is bad enough, but the real problem comes from the strong storm waves on the surface of these rising waters.

(Continued on Page 44)

Extension 49

By GEORGE SINGER

Another Around the World Fair has come and gone. This year's Fair undoubtedly was the most successful of all. Attendance was higher, the gross was larger and the weather couldn't have been better. Our Patrons certainly can be proud of a job well done. The Museum, the ultimate beneficiary, becomes more of an entity when represented by these dedicated workers. As I stood on the second floor shooting pictures of the crowd, I happily noted how those red aprons stood out in the throng.

Then I realized philosophically how even without those identifying aprons our ladies would stand out in a crowd. It is what they believe in that makes them outstanding, with the obvious result that, among all museums, our Museum is unique because of them and others like them.

There were many interesting happenings at the Fair, Mrs. Claire Weintraub tells of one. She was stationed at the public address platform, when a group of children came by looking for their "lost" mother. They told Claire that their mother could be easily identified because she was pregnant. Mrs. Weintraub, reasoning with the kids, said she had observed quite a few women in that same condition in attendance and that certainly more of a description was needed. A quick reply by the children, set the record straight, "Naw, she'll be easy to find. She's wearing a T-shirt with the word 'BABY' on it and an arrow pointing down to her belly!"

She was located within a few seconds and the family, plus one, was quickly reunited.

Interesting Two Days

Personally, I had an interesting two days at the Fair. In an effort to boost memberships, a booth was set up just inside the main gate. With a clever computer, a Casio Biolator Electronic Calculator donated by Neiman-Marcus, the Museum of Science gave biorhythm readings. Each person that came by was given a membership blank and brochures about the Museum. My wife, Helen, and I manned the booth both days aided on Saturday by Linda Gaffney (Membership) and her friend Eddie Ovett. We "read" a total of 338 people over the two days. By closing time Sunday my voice was gone.

The theory of biorhythm was developed by Bernard Gittleson, who says that your life is governed by a series of three cycles that begin at birth. These are a 23-day physical cycle, a 28-day emotional cycle and a 33-day intellectual cycle.

We told those who paid 25 cents for their calculation that we were not promoting biorhythm, but merely showing the application of a scientific theory (biorhythm) to a scientific fact (computers). The money we made will be used to update our Audio/Visual presentation about the "new" Museum.

Property of Museum

The calculator will remain the property of the Museum and we are looking for a local electronics development firm to adapt it for exhibit purposes.

A large number of people believe in and some industries are investigating the biorhythm theory. Be it fact or fiction, only the future will tell. However I am preparing an article for a future issue of MUSEUM.

Along with the biorhythm aspect of the calculator, it also performs regular arithmetic functions of addition, subtraction, multiplication and division. As an added attraction of membership in the Museum, for a limited time, we are offering a free Casio Biolator Electronic Calculator with each new or renewed Donor Membership which is $500 annually. Call the membership office at the Museum for more information.

Our thanks goes to Neiman-Marcus, Bal Harbour, for this exciting instrument and especially to Enid Rosenthal (N-M Public Relations) for her assistance in making it available to us.

One more Fair connected story before we enter this year's event into the history book of the Museum.

Two Experiences

The heated activity that leads to the Around the World Fair is amplified by the experiences of two Patrons, each on the same day. It was on Jan. 26, the day the Patrons held their meeting at the Museum. Grace Hall stopped to have some papers copied on the way to the meeting. The machine operator noticed a funny smell. She opened

APRIL AFFILIATE CALENDAR

All clubs welcome visitors. Unless otherwise noted they meet at 8 p.m. Listed are presidents and meeting dates.

Archaeological Society of the Museum of Science, Norman Rogers, 3rd Friday, April 16, 8:30.

Dade Radio Club, Saul Dorin, 3rd Tuesday, April 20.

Florida Marine Aquarium Society, Bob Gould, 4th Tues., April 27.

Friends of Physics of the University of Miami, Shirley Wheeler, Call W. K. Leu, 350-1472 for meeting place.

Historical Association of Southern Florida, R. Adm. Irvin J. Stephens, 1st Tuesday, April 6.

Horticulture Study Society of Florida, David D. Fry, 2nd Wednesday, April 14.

Institute of Maya Studies, Charles Lacombe, 3rd Wednesday, April 21.

Miami Amateur Meteorological Society, Walter R. Davis, no meeting.

Miami Mineralogical and Lapidary Guild, Ed Hance, 4th Monday, April 26.

Optical Society of America, Florida Group, Dr. Joseph Hirschberg, surrogate, no regular meeting times.

Rare Fruit Council, Dr. Robert A. McNaughton, 2nd Tuesday, April 13—7:30 p.m.

South Florida Herpetological Society, Saul Friess, 2nd Monday, April 12.

South Florida Shell Club, Walter R. Surgeon, 4th Wednesday, April 28.

Southern Cross Astronomical Society, Arthur P. Smith Jr., 3rd Monday, April 19.

Tropical Audubon Society, Peter Quincy, 3rd Tuesday, April 20.

Zoological Society of Florida, Michael M. Kevorkian, 1st Wednesday, April 7.

the copier and found Grace's papers in flames.

Meanwhile, back at the Museum, Shirley Stevenson was preparing coffee for the meeting when all of a sudden the coffee maker sputtered, flamed and was enveloped in a cloud of smoke.

Unusual, you say? Not really when you consider it happened to two Patrons. When they get started on something just watch their smoke!

Pet Rocks

Fad...Christmas 1975 was marked by another of those crazes that hit society every so often. Remember the "pet rocks"? Some wild marketing man hit on an idea and no home was complete without a pet rock. Instructions came with them on the care and feeding of your rock. There were even pedigrees and family trees available to those who fell into the scheme. However, through all this was heard the chuckling and outright laughter of a group of people inside the Museum.

Tracking down the source we found our affiliate, The Miami Minerological and Lapidary Guild. The reason for the laughter was obvious, their members have been "petting" rocks for years. Ha! If the public only knew.

Well, the public will have a chance to know and then hang heads in shame for falling for the "new" pet rock ruse, by attending the Rock-O-Ree scheduled for April 10 and 11, the Miami Minerological and Lapidary Guild's annual show at the Museum. This year's show will again prove to the world what a truly exciting hobby this really is. It certainly isn't a fad with our people.

Who ever said that people with rocks in their head don't have a great time? "CRUNCGRACKITE" said my pet rock, which freely translated means, "Not I!"

"IT"

We all make mistakes...By the time this appears in print, "IT" may have gone to rest on the repository on Virginia Key, known affectionately as the dump. But I must tell you about "IT".

"IT" happens to be an exhibit acquired by our director, Don Starkey. "IT" was created by a group known as the Storytellers. At this writing, "IT" occupies the center position of Gallery A. Don saw this at a meeting of museum types in some distant city. If I sound vague on my information it is intended only to protect the innocent. "IT" caught Mr. Starkey's attention immediately. (What was he thinking about?) "IT" was requested to be sent to Miami after the show. (I hope the label wasn't too big, anonymity is best with an object like this.)

As Don explains, "IT" really is a conglomeration of cubes, shapes, graphics and lights designed to tell a story. (Actually it resembles a Rube Goldberg nightmare.) Anyway, now I'm into it by trying to come up with a plan to add sound and a light organ to "IT". (A director can convince you of anything.) If "IT" still is on display it's worth a trip to see because words will never be able to describe "IT". (Sharon, he needs rest!)

Help...A friend of ours asks your help again this year. So don't forget the Channel 2 Auction. WPBT is calling it the "Great American Auction" and it is taking place from April 2 through the 10. Call now (Channel 2) to volunteer your time and/or merchandise. And, beginning April 2, Watch, bid and buy!

Kicker...The Museum effort on behalf of Guatemalen relief, after that tragic February earthquake, is described elsewhere in this issue. Not contained in that article is this bit, because I thought it could be better be covered here.

During the hectic pace of the donations arriving not all contributions could be screened as they were offered, so many boxes were accepted sight unseen. All the things were repacked and labeled before shipment. Two boxes shocked and then astounded the volunteers working in the parking lot. You wonder what could have possibly been in the minds of those that donated these two cartons. This could be the cruelest of the cruelty jokes. One box contained an assortment of ladies wigs AND the second one, an untold number of "Falsies".

NEW MEMBERS

STUDENTS—Jeffrey Buamd, Alison Buchbinder, Richard S. Cullen Jr., Kristen Dalsak, Shahi Falic, Dale Fishman, Noah Franklin, Brade Gabe, John Michael Groff Jr., Kim Harris, Andrew Herskiwitz, Alyson Breslow Kashuk, Scott W. LaMola, Orlando Maytin Jr., Corey Moss, Lorin Munchick, Bryan Rosenfeld, Amy Salkind, Ari Schantz, Gerald Sokol, Joel Susi, Amy Todd, Rene Vicente.

INDIVIDUALS—Cameran Allmand, Michael Jason Bier, Dr. Maria T. Canning, Bob Croes, Mrs. Jeanne Curtiss, Jack F. Durie Jr., Marion Flood, Marcia L. Frumberg, Nanci Gioia, Beverly Goodman, Miss Jean Hall, David Halpern, Laurie Hoot, Diane Karnilla, Celia Katchen, Richard C. Kern, Mrs. Karl Koch, Mark V. Lasleben, Alden C. Olander, H.E. Ostmark, Elizabeth Purches, Deborah S. Richards, Mrs. Phillip Roller, Gary M. Service, Gail Susan Tucker, Dian Vee, Geraldine S. Vladimir, Pat Wiener, William C. Wrigley.

FAMILY—Mr. & Mrs. John R. Barrett, Mr. & Mrs. John A. Barrow Jr., Mr. & Mrs. Edward L. Batoff, Mr. & Mrs. Lamar Black, Roy & June Blair, Mr. & Mrs. Arnold Blaustein, Dr. & Mrs. Robert Boucek, Mr. & Mrs. John A. Brennan, Ms. Anne Cohen, Mr. & Mrs. Arthur L. Conaty, Jr., Ms. Mary Depree, Mr. & Mrs. Peter Ehrlich, Mr. & Mrs. Leonard Fels, Mr. & Mrs. Robert J. Gambach, Ms. Helen Geber, Dr. & Mrs. Philip R. Gould, Mr. & Mrs. James S. Gray, Mrs. Barbara Hoar, Ms. Merry Haber, Capt. & Mrs. E.C. Jackson, Mr. & Mrs. James H. Kiley, Mr. & Mrs. Harry B. Kitchin, Dr. Stuart Kline, Mr. & Mrs. Jacol S. Lasky, Mr. & Mrs. Anthony Lee, Mr. & Mrs. Sidney Light, Mr. & Mrs. Robert F. McCormick, Mr. & Mrs. Alexander Moss, Zachary & Claire Milo, Mr. & Mrs. Arthur Pappas, Mr. & Mrs. Miguel Penton, Mrs. M.A. Phillips, Mr. & Mrs. Wesley C. Piehl, Ms. Teresa Rattazzi, Mr. & Mrs. O.J. Reich, Mr. & Mrs. Louis Richmond, Ms. Janet Schwartz, Mr. Jack L. Scott, Jr., Mr. & Mrs. N. David Snyderman, Mr. & Mrs. L. George Soll, Mr. & Mrs. Frank Y. Speight, Mr. & Mrs. William Stokes, Mrs. L. Stuut, Ms. Eleanore Suissa, Mr. & Mrs. Jack R. Waidley, S. Wainberg, Mr. & Mrs. Stephen Walker, Mr. Richard L. Willet, Ms. Judith Wolf, Mr. & Mrs. William M. Wolfarth, Mr. & Mrs. Lawrence Young, Mr. & Mrs. Donald Zucker.

ASSOCIATE—Lenore R. Cyole, Beverly Ann Creely, Ms. Dorothy Lindsay, Roland A. Saye Jr., Harriet E. Schieser, Robert Sickels, Eleanor Tillich.

Mrs. Parks to Talk on Fortifications

Arva Moore Parks will discuss "Fortifications in the Miami Area" at the April 6 meeting of the Historical Association of Southern Florida at 8 p.m. in the Museum of Science Auditorium.

Mrs. Parks' lecture will cover early fortifications in frontier Florida prior to the Spanish American War. Her research is part of a continuing study of pioneer life in pre-railroad Florida.

Bobcats

(Continued From Page 6)

accepted on behalf of the Museum of Science.

When it was learned that this gift would be made, it was agreed that it would be used in a manner beneficial to the Museum. So it will be used to boost membership in our "Century Club."

If you would like to own the Bobcats all you have to do is join the Museum of Science Century Club. This is the membership that costs $100 annually. Anyone who joins or renews membership in the Century Club between now and the end of October 1976 will be eligible.

Each new or renewed membership in the Century Club will receive a numbered membership card. A matching numbered card with your name will be placed in a strong box. Plans are being formulated to hold a Century Club party late in October, at which time the winning number will be drawn. Those holding memberships of lower denomination may join the Century Club and become eligible for the Boehm Bobcats, but the Century Club membership will be computed from the expiration date of the other membership you held. If you need any more information, please call the membership office.

The Museum of Science, as Mrs. Weintraub said, wishes to thank Mrs. Edward Marshall Boehm, The Boehm Studios, Neiman-Marcus, N-M Manager Robert Ackerman and Mrs. Enid Rosenthal, N-M public relations for this beautiful gift.

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450 North Park Road
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Carolyn Tripp Kurtz, Staff Artist, Passes

Mrs. Carolyn Kurtz Tripp, a member of the Board of Fellows of the Southern Cross Astronomical Society for 25 years and onetime vice president, secretary and treasurer, died of cancer on Feb. 27. She was 59.

In addition to raising two children, she was successful in business, writing and art. She painted Museum murals and black-light panels in the Planetarium among her many volunteer activities. But she was known best of all for her meticulous repainting of the giant globe in the Museum lobby.

At the conclusion of the project, she was named staff artist but spent most of her time afterward updating the Museum's collection records.

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Notify MUSEUM magazine 60 days in advance of moving to preserve your subscription and to prevent loss of the magazine. Clip and send address label from the magazine together with your new address to MUSEUM magazine, 3280 South Miami Avenue, Miami, Florida 33129. Postmasters have change of address cards.

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Latins & the Museum

by rolando millas

Tuvimos el honor de recibir la visita del Consul General de España, Sr. José Luis de la Guardia, el cual veniá acompañado de su esposa e hijos. Primeramente los llevamos a que vieran las exposiciones en los distintos edificios de nuestra Institución y después, asistieron al show que el Planetarium presenta en español.

☆ ☆ ☆

El Sr. Wilbert Sánchez, Director de la Delegación en Miami de la Secretariá de Turismo de México, ofreció una interesante conferencia en nuestra Institución. El tema de la conferencia fué "Yucatán, su historia, tradiciones y costumbres." Tambien fué exhibida la película "Yucatán" narrada en español. Un panel de periodistas integrado por Maucha Guitiérrez, del Canal 23 y W.Q.B.A. y Manolo Centeno, Oficial Mayor del Departamento de Publicidad y Turismo de Miami tuvieron a su cargo hacer las preguntas relacionadas con la conferencia.

☆ ☆ ☆

Recientemente visitaron nuestra Institución, los distinguidos periodistas de Guatemala, Mary Chuá, Raúl González, Carlos Mejías, Carlos Monterroso, Miguel Zetina, Germán Duarte, Victor Hugo González y Ramiro McDonald Blanco. Acompañaban a este grupo de profesionales, el Sr. Mario Castillo Sinibaldi, Presidente de Aviateca y el Sr. Albert Weintraub. Asistieron al show que presenta el Planetarium en español y después pasaron a la Plaza Maya. Posteriormente se les ofreció en su honor una recépción.

☆ ☆ ☆

Una interesante reunión celebramos con nuestro buen amigo Demetrio Perez Jr., Presidente de la Asociación de Escuelas Privadas Bilingües. Nuestra Institución tiene interes de presentar programas en español para la juventud. La División Latinoamericana tendrá a su cargo el estudio de la clase de programas que quizás se puedan ofrecer en un futuro cercano.

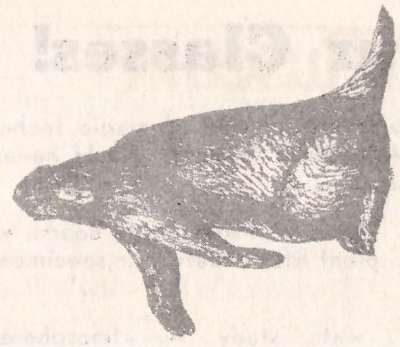
☆ ☆ ☆

Queremos expresar nuestro agradecimiento a Maucha Gutiérrez, Ada Bejar, Nirso Pimentel y Victor González por la magnífica actuación de cada uno de ellos en el show del Planetarium "El Cometa del Bicentenario". En realidad la labor que realizaron estos distinguidos profesionales es admirable.

☆ ☆ ☆

Nos sentimos muy satisfechos de que personas de los distintos países de la America Latina asistan a los programas que presentamos en español.

Children's Saturday Science Series 1976



SESSION V: May 1st to June 5th

Registration: MON. - FRI. 9:00 - 4:00

Museum Members: March 29th - April 30th

General Public: April 12th - April 30th

NO REFUNDS AFTER THE FIRST CLASS

TUITION MUST BE PAID AT TIME OF REGISTRATION

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Museum of Science and Planetarium

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ROCKETRY: Learn the "HOW" .. then build a rocket. Start the countdown, then, "WOW" .. BLASTOFF! 2 hrs. of instruction!

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CHILD - ADULT PHOTOGRAPHY: Camera instruction (lens F stops and shutter speeds); types of cameras; use of auxilary lens; understanding film "speed"; the use of light in photography; seeing pictures; photo field trips; developing film, photographic enlarging.

CABOCHON: Taught by our polished instructors. Turn raw rocks into beautiful jewelry. LIMIT, 5 STUDENTS PER CLASS. AGE 10 AND OLDER. Must be a museum member. Please, no repeat.

BUILDING!: Students may select from many types of construction and models. Creativity and workmanship will be stressed. A real cornerstone course. ..

CREATIVE ART: Come do your own thing. Batik, ceramics, decoupage collages, pastels, watercolors. Let go and really create.

MEETING NATURE: Letting the students discover the wonders of natural life around them.

SURVIVAL: Learn how to live in the outdoors. What to eat, simple first aid & emergency life procedures. Getting "stuck" becomes fun!

ADVENTURE BY THE SEA: This course is designed to aquaint the student with the variety of life on by the seashore. This instruction is to give the student a respect for life forms other than his own.

NATURE CRAFTS: Let your imagination go and creativity flow -- Materials found in nature will be used to paint, print, collage and create fun and exciting projects. Birdfeeders, planters, mosiacs, hats, stationery, pictures, animal figures and lots of suprises. Come and see!

FLORIDA - FROM THE GROUND UP: A daily field trip study of South Florida's rocks, topography, fresh & salt waters, plant and animal communities, topped off by the weather and the star that keeps it all moving.

WHAT ON EARTH: How are rocks made? What are minerals? How did it all begin? You'll be making your own crystals - and be developing your own rocks.

MARINE ZOOLOGY: The progression of the Phyllum will be studied. Students will learn dissimilarities of the species with laboratory disection as a primary teaching technique.

IMPORTANT INFORMATION

1) Classes are filled on a "First Come" basis only. Museum members should take advantage of the member's priority registration dates.
2) Please make checks payable to MUSEUM OF SCIENCE. Registration forms should be filled out completely. If applying for membership also, the completed membership form must accompany the registration.
3) Class fees include all materials. Marine Biology students supply their own bucket and hand net.
4) Class enrollment is limited to 15 students per course. Cabochon limit is 5 students per class, must be a current Museum member.
5) We reserve the right to cancel any class where enrollment is less than 5 students.
6) Registration fee is due at time of registration. No refund after first class session.
7) Your cancelled check is receipt of paid tuition. No receipt of registration will be sent. If class is filled, parents will be notified and fee returned. MARK YOUR CALENDAR FOR CLASS STARTING DATES!
8) Waiting lists are available for the Cabochon classes only!
9) To facilitate registration, mark "EDUCATION OFFICE" on your envelope before mailing to the Museum.
10) Visitors are not permitted to attend Museum classes. Contact the Education Department for details.

April 1976

SATURDAY CHILDREN'S SCIENCE SERIES

SESSION V; May 1st To June 5th

COURSE	TIME	TEACHER	FEE Memb.	FEE N.M.	ROOM	GR. LEVEL
Advanced Magic Workshop	9:00 - 11:00	Goodman	40.00	50.00	Aud.	4 - 8
Marine Biology I	9:00 - 11:00	Maturo / Schwartz	15.00	20:00	Bus I	1 - 3
Marine Biology II	9:00 - 11:00	Losyk	15.00	20.00	Bus I	4 - 8
S.W.A.T.S.	9:00 - 11:00	Ryttenberg	15.00	20.00	Bus II	4 - 6
Rocketry	9:00 - 11:00	Roth	24.00	32.00	Hallway	4 - 8
Florida - from the ground up	9:00 - 11:00	Gw. Scott	15.00	20.00	Bus II	1 - 3
Ceramics	9:00 - 10:00	Padilla	15.00	20.00	Room A	1 - 3
Nature Crafts	9:00 - 10:00	Brown	15.00	20.00	Chickee A	4 - 8
Let's Explore A	9:00 - 10:00	Walroth	15.00	20.00	Room C	Ages 4 - 6
Adventures by the Sea	9:00 - 10:00	Mealey	15.00	20.00	Chickee B	1 - 3
Kitchen Chemistry	9:00 - 10:00	Grace	15.00	20.00	Room B	4 - 8
Printmaking A	10:00 - 11:00	Padilla	15.00	20.00	Room A	1 - 3
Printmaking B	10:00 - 11:00	Padilla	15.00	20.00	Room A	4 - 8
Let's Explore B	10:00 - 11:00	Walroth	15.00	20.00	Room C	Ages 4 - 6

Kitchen Chemistry	10:00 - 11:00	Grace	15.00	20.00	Room B	1 - 3
Nature Crafts	10:00 - 11:00	Brown	15.00	20.00	Chickee A	4 - 8
Adventure by the Sea	10:00 - 11:00	Mealey	15.00	20.00	Chickee B	1 - 3
Child - Adult Photography	10:00 - 12:00	Ge. Scott	33.00	44.00	Dark Rm.	4 - 8
Cabochon	10:00 - 12:00	Lapidary Staff	20.00	x	Cab. Rm.	Age 10 - +
Magic Workshop	11:00 - 12:00	Goodman	18.00	24.00	Aud.	4 - 8
Building!	11:00 - 12:00	Roth	15.00	20.00	Hallway	4 - 8
Creative Art	11:00 - 12:00	Padilla	15.00	20.00	Room A	1 - 3
Nature Crafts	11:00 - 12:00	Brown	15.00	20.00	Chickee A	4 - 8
Let's Explore A	11:00 - 12:00	Walroth	15.00	20.00	Room C	Ages 4 - 6
Kitchen Chemistry	11:00 - 12:00	Grace	15.00	20.00	Room B	1 - 3
Adventure by the Sea	11:00 - 12:00	Mealey	15.00	20.00	Chickee B	1 - 3
Meeting Nature	11:00 - 12:00	Ryttenberg	15.00	20.00	Chickee C	Ages 4 - 6
Survival	11:00 - 12:00	Schwartz	15.00	20.00	Area II	4 - 8
Wildlife Walk	11:00 - 12:00	Maturo	15.00	20.00	Area I	Ages 6 - 8
Marine Zoology	11:00 - 12:00	Losyk	15.00	20.00	Bus I	1 - 3
What On Earth	11:00 - 12:00	Gw. Scott	20.00	25.00	Gallery	2 - 3
Cabochon	12:00 - 2:00	Lapidary Staff	20.00	x	Cab. Rm.	Age 10 - +

NOTE: If applying for membership also, please complete the membership application and include with class registration form. Registration and membership costs may be included in one check.

REGISTRATION FORMS

CHILD 1:

STUDENT'S NAME_____ GRADE ___ SCHOOL _____
ADDRESS _____ ZIP _____
PARENT'S NAME _____ PHONE _____
MUSEUM MEMBER _____ TYPE _____
COURSE _____ HOUR _____ FEE _____
COURSE _____ HOUR _____ FEE _____
COURSE _____ HOUR _____ FEE _____
CLASS TOTAL _____
BUS SERVICE _____ WHICH STOP _____ BUS FEE _____
MEMBERSHIP _____
GRAND TOTAL _____

CHILD 2:

STUDENT'S NAME_____ GRADE ___ SCHOOL _____
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PARENT'S NAME _____ PHONE _____
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COURSE _____ HOUR _____ FEE _____
COURSE _____ HOUR _____ FEE _____
COURSE _____ HOUR _____ FEE _____
CLASS TOTAL _____
BUS SERVICE _____ WHICH STOP _____ BUS FEE _____
MEMBERSHIP _____
GRAND TOTAL _____

MEMBERSHIP APPLICATION (Please Print or Type)

Student — $10.00 Family — $20.00

Name _____
Address _____
City _____ State _____ Zip _____
Phone _____
Type of membership _____
(Please include with class Registration Form)

date expired _____
Renewal ☐
New Member ☐
Names of Children (Family Only)
_____
_____
_____

BUS INFORMATION: (1 session is 6 Saturdays of classes.)

NORTH DADE PRIVATE BUS

FEE: $6.00 Per Session Round Trip — $3.00 Per Session One Way

STOPS: 8:00 North Miami Beach City Hall
8:10 Wm. Jennings Bryan Elem. 12th Ave. side
8:20 Miami Shores Comm. Ctr.
8:25 Junior's at 79th Street

BUS LEAVES FOR RETURN TRIP AT 12:05!

— AND —

SOUTH DADE PRIVATE BUS

FEE: $6.00 Per Session Round Trip — $3.00 Per Session One Way

STOPS: 7:55 Shopping Ctr. - Ludlum & Graham Dairy Rd.
8:15 Seminole Elem. (Front Driveway)
8:30 Suniland Shopping Center
(At Security Federal Bldg.)

BUS LEAVES FOR RETURN TRIP AT 12:05!

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Dennis F. Geesey
Coordinator of Museum Education

April 1976

NATURE CHECK

By Margaret Scott
Artist: Jean Subers

QUESTIONS:

1. Name the seasons of the year.
2. Does all the world have winter simultaneously?
3. Locate the southern hemisphere.
4. What is the equator?
5. When Earth's northern half has spring, the southern half has which season?
6. Name New Zealand's most popular summer vacation month.
7. Does insolation mean exposure to sunlight?
8. What is the annual march of insolation?
9. What causes most weather changes near the equator?
10. The Arctic Circle and Tropic of Cancer are Earth temperature zone boundaries. Name the other two.

ANSWERS:

1. Winter, spring, summer, autumn.
2. The southern hemisphere has summer when the northern hemisphere has winter.
3. South of the equator.
4. The imaginary circle around the Earth midway between the north and south poles.
5. Autumn.
6. January.
7. Yes.
8. The gradual change during the year of sunlight exposure.
9. Wind movement. Sunlight exposure is about the same all year.
10. Tropic of Capricorn and Antarctic Circle.

Big Eye in South

By AL VOLKER

The southern hemisphere's largest optical telescope—a 158-inch instrument that will allow astronomers to view the edges of the universe in southern skies—began operations in January on a mountaintop near the town of La Serena, about 300 miles north of Santiago, Chile.

The new reflecting telescope at Cerro Tololo Inter-American Observatory will give astronomers their best look yet at the Magellanic Clouds, and the brightest star clusters visible only from the southern hemisphere.

The 45-foot-long telescope is housed in a 14-story building with a 500-ton dome that rotates on 32 sets of wheels. It was funded jointly by the U.S. National Science Foundation and the Ford Foundation.

☆ ☆ ☆

A 647-pound spacecraft, designed to monitor the Earth's environment as well as solar activity, was placed into a 22,250-mile orbit last fall from Cape Canaveral, Fla.

The National Oceanic and Atmospheric Administration satellite was launched by a National Aeronuatics and Space Administration Delta rocket.

GOES-A (for Geostationary Operational Environmental Satellite A) provides NOAA scientists with pictures of about a quarter of the Earth's surface at 30-minute intervals both day and night.

☆ ☆ ☆

Although many molecules come in two forms—mirror images—that have the same relationship as right and left hands, these forms are not necessarily biologically active.

In 1972, many theories about the sense of smell had to be revamped when scientists found that humans could easily discriminate between such forms of the chemical carvone, which is used in flavoring and perfumery. Now Shingo Marumo, a Japanese scientist, has found the same situation exists for the gypsy moth sex attractant disparlure, wherein one form is 1,000 times more effective than the other. The discovery has broad implications in understanding not only the way insects locate mates, food and shelter but also the phenomena of taste and smell in general.

☆ ☆ ☆

Ben Tyson, a NASA scientist at the Ames Research Center, is refining a way to detect in drinking water chemicals which the Environmental Protection Agency is investigating as possibly harmful to human health.

In a recent survey, EPA analyzed

drinking water from 80 American cities for six compounds, all familiar to chemists as substances one must handle carefully in the laboratory. Carbon tetrachloride, a commonly used cleaning fluid, was found in water supplies of ten big cities, and chloroform, sometimes used as an anesthetic, was found in 80. Miami was one of those cities with a relatively high concentration of chloroform, a by-product of chlorination.

Gas chromatographs are used. The principle is similar to that of rolling balls with different friction properties down a chute: they can be separated according to the time they require to complete a run. In the chromatograph, the measurements apply to molecules which correspond to the rolling balls.

☆ ☆ ☆

A simple underwater habitat built by mechanical engineering students at the University of Wisconsin has been placed at the bottom of Lake Mendota. UW Sea Grant officials believe it will be the first underwater facility to remain in place under winter ice.

The 12-foot habitat, seven feet in diameter, rests in 28 feet of water. At such a shallow depth, divers need not go through decompression on arising. The habitat's purpose is to train scientists to do their own underwater research instead of relying on divers to do it for them.

74 Weather Projects

Seventy-four weather modification attempts were made by NOAA in 1974. The results are still being studied.

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Dumping in Bight Hasn't Hurt People

Despite evidence that disposal of wastes off New York City has caused some ecological damage, there appears to be no immediate threat to human health or to Long Island beaches.

A preliminary report in a seven-year study of New York Bight, the 15,000-square-mile area extending to the edge of the continental shelf from an apex between Long Island and New Jersey, indicated that ocean dumping as now practiced should cease as soon as alternatives are found.

Sewage sludge, dredge spoil, waste acid and other materials totaling nearly a half-billion cubic feet a year are dumped into the bight.

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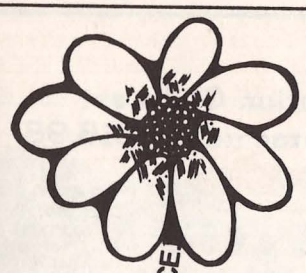

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Coastal Zone

(Continued from Page 25)

Waves in a storm surge begin to attack areas where normally waves do not cause problems. I am thinking in terms of the upper berm on beaches, hotel lobbies, the living rooms of beach homes. The development of these offshore islands would very definitely reduce the amount of wave action and thus would reduce the damage resulting from these hazardous waves riding on top of a hurricane storm surge.

Politically Controversial

Perhaps the most politically controversial aspect of these islands relates to beach erosion. The erosion of south Florida's beaches results from two phenomena. The first of these is the longshore current which moves sediment in suspension generally on this coast from north to south. The second is the waves themselves. As waves break on the beach, they throw sand grains into suspension. The sand grains then start to fall back down to the bottom, but the place where they fall is somewhat to the south of the place where they were picked up because of the longshore current. Therefore, if you can reduce the wave action at the beach, you will then reduce the southerly movement of sand; that is, the sand grains can not be thrown into suspension by the smaller

(Continued on Page 46)

MUSEUM MAGAZINE SCHOOL/CAMP DIRECTORY

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April 1976

Coastal Zone

(Continued From Page 44)

waves in the lee of these offshore islands. What this means is that sand migrating down the coast with the longshore current, once coming in the "shadow" of these islands, will then be deposited. Gradually you will have a buildup of sand on the beach in the lee of the islands.

For something over five years I have been trying to get the federal government, the state government, the Miami Tourist Development Authority, anyone, to sponsor a relatively inexpensive engineering study of the feasibility of offshore islands for the south Florida area.

Maybe the idea is no good; if so, it should be discarded. On the other hand it may be a good idea, and I would hope that someday some group could say this is in fact worth investigating.

Limit Acreage

One possibility that should be considered is the limiting of actual ocean front acreage to those industries or other uses which require their being right on the water. If an activity can be located equally well in West Palm Beach or in west Dade County or in the western part of Broward County rather than on the waterfront, it should be denied access to the waterfront.

Virginia Key is an island between Key Biscayne and the mainland connected to both of them by causeways and bridges. Several years ago the Miami City Commission and the Dade County Commission were convinced that with a heavily tourist-dependent economy, it was important to develop other activities within the area which could lure new industry and new dollars into the county. Thus we were able to convince both Metro Dade County and the City of Miami to zone 162 acres specifically for marine research work.

Presently the complex has the Miami Seaquarium, Planet Ocean of the International Oceanographic Foundation, the world-renowned Rosenstiel School of Marine and Atmospheric Science of the University of Miami, and two NOAA Laboratories: the Southeast Fisheries Center of NOAA's National Marine Fisheries Service, and my own Atlantic Oceanographic and Meteorological Laboratories.

Over the past year, we have worked with Dade County, and three acres of county land have just been transferred to Miami-Dade Community College for its marine technician training program, and five acres have gone to a group from industry known as Palisades Geophysical Institute which does primarily underwater acoustic research work for the navy.

In ten years I can see Vir-

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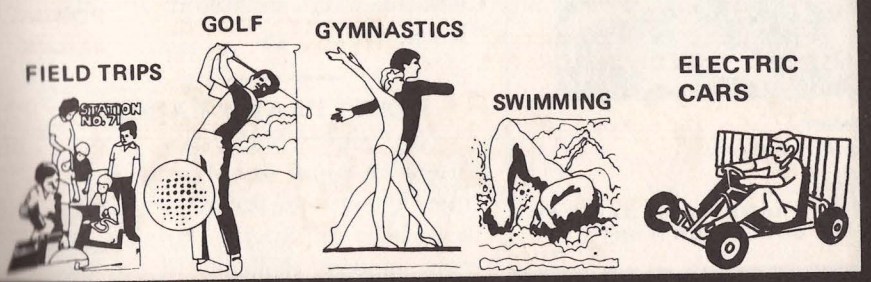

ginia Key being the major marine research area in the United States, if not the entire world. Today one thinks of the Scripps Institution of Oceanography in California and the Woods Hole Oceanographic Institution in Massachusetts as the major oceanographic research places in the United States. But neither group had enough foresight to provide space for long term development. If you wanted to locate near the Scripps Institution of Oceanography today, you could get probably no more closer than eight or ten miles and be way back on the mesa. If you wanted to be at Woods Hole, there would be no chance. Even Woods Hole Oceanographic Institution itself has had to build a second campus several miles away and inland from their main coastal lab and ship facility.

The sort of thing that is happening with the growing marine science complex on Virginia Key is not something that happens by itself. It takes concerned and dedicated citizens willing to approach their local governments and to lobby, if you will, to see that the things that have to be done are in fact accomplished.

In conclusion, I would like to be sure that I leave with you only really one major point. That is in consideration of the economics of the Southeast Florida Coastal Zone, you can not afford to neglect the ocean. We must consider it; we must take care of it; we must utilize it effectively. But in order to do this and to assure the continuing economic growth of the Southeast Florida Coastal Zone, we must continue to consider the ocean as the major aspect that makes our coastal zone and its economic and industrial development problems considerably different from those of Saint Louis, Kansas City, or Cedar Rapids, Iowa.

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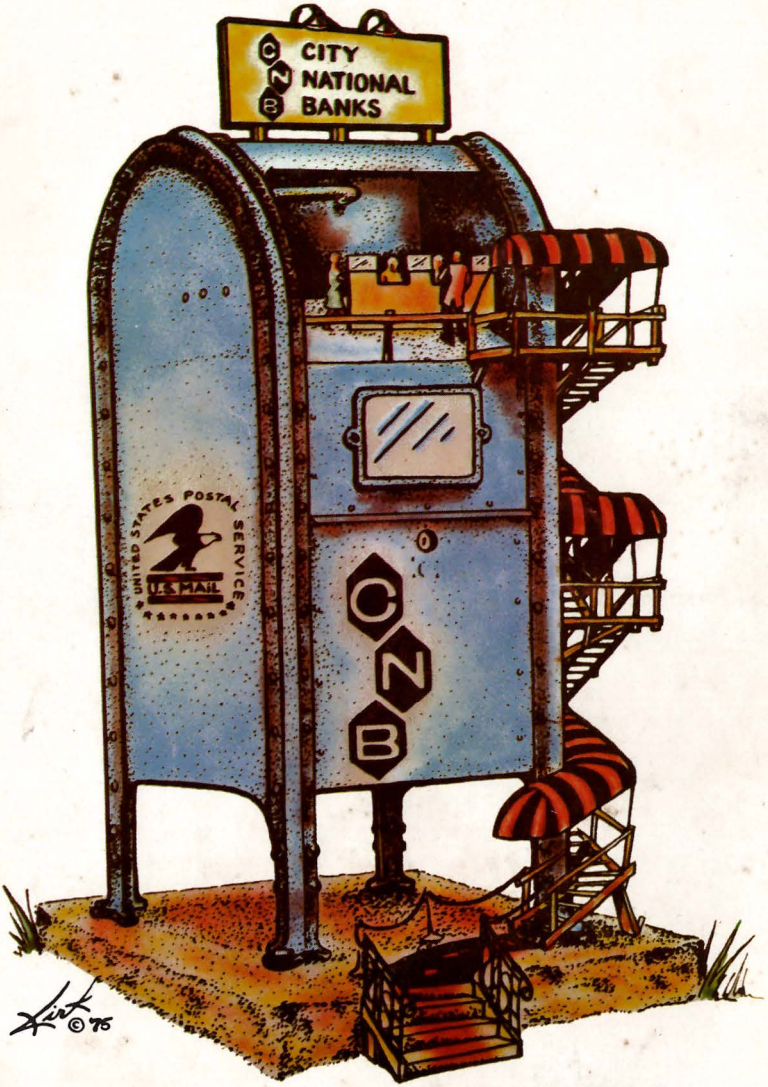

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